If Things Go Wrong...

By WILLIAM J. CROMIE Copyright 1969 World Book Science Service

The United States has spent \$24 billion so far to land two men on the moon, but no provision has been made to rescue them should they become stranded on the lunar surface. If the ascent engine on the lunar landing module does not fire, Apollo 11 astronauts Neil Armstrong and Edwin (Buzz) Aldrin will have to remain on the moon without hope of survival while Michael Collins circles helplessly overhead.

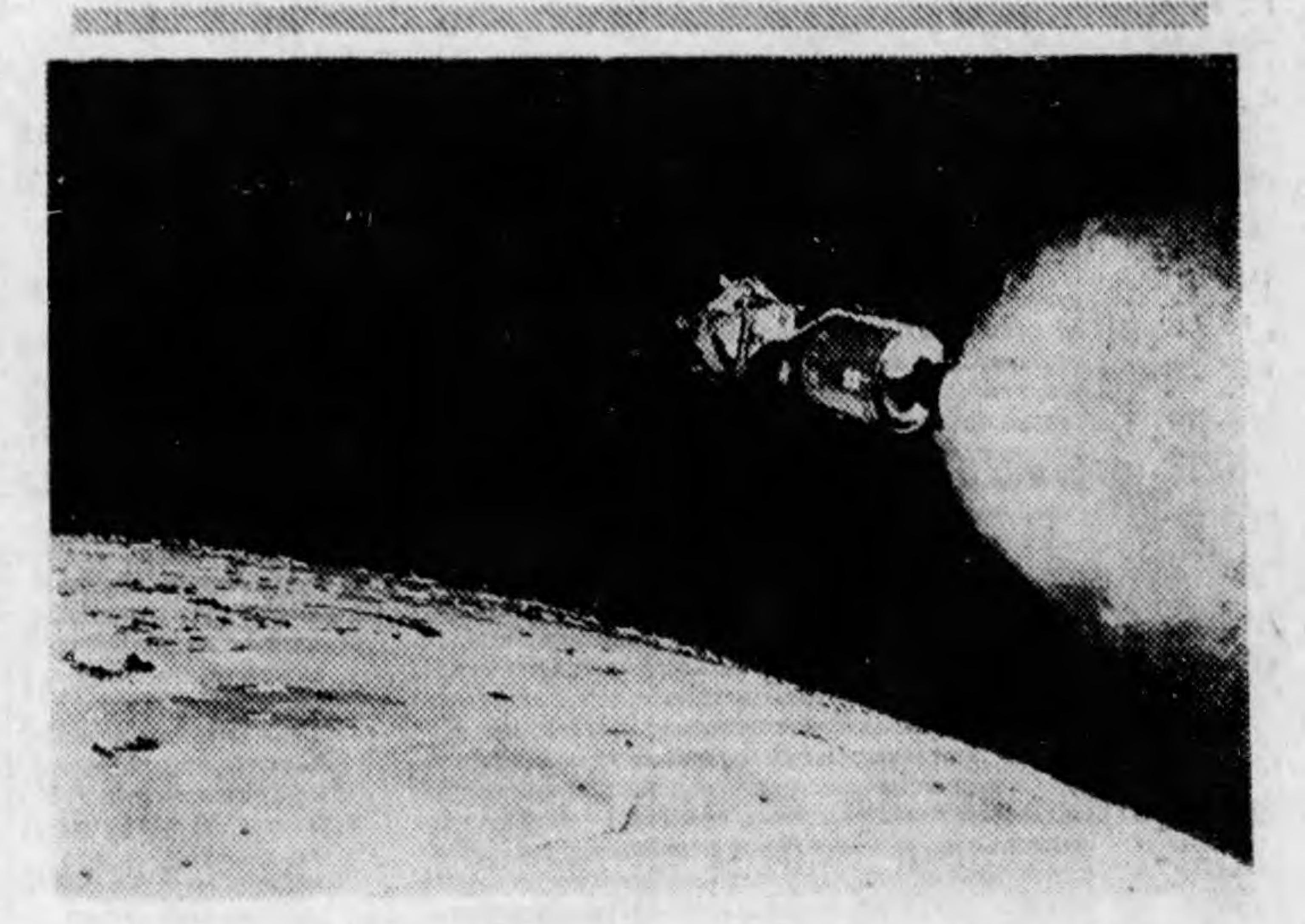
When asked how he felt about this possibility. Neil Armstrong, commander of the mission, answered calmly: "That's an unpleasant thing to think about, and we've chosen not to think about that up to the present time. We don't think that's at all a likely situation. It's simply a possible one, but at the present time we're left without recourse should that occur."

IN THE EARLY days of the space program, NASA decided that space rescue would be too difficult and costly. The agency chose, instead, to concentrate on making the systems as reliable as possible and providing so many alternate or backup systems that chances of failure would be very small. It has stuck with this decision, although various Congressmen have criticized it for not changing this approach at the beginning of the sophisticated Apollo program.

It costs much less to make the ascent engine as reliable as possible than to provide a separate rocket and rescue vehicle. Also, the dangers faced by those in the rescue vehicle would be as great as the hazards faced by the original expedition.

The 4½-foot-long, \$250,-000 engine that the astronauts must rely on is relatively simple. It has no spark plugs or carburetor, and few moving parts. Helium and an oxidizer are forced through nozzles or injectors into a combustion chamber. The two liquids ignite on contact. On takeoff from the moon, the engine is supposed to burn about seven minutes and produce enough thrust to

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Apollo Timetable Today

5:32 a.m.—Crew awakens.

7:26 a.m.—Course adjustment, if necessary.

12:26 p.m.—Apollo 11 fires main rocket engine behind moon and drops into moon orbit 69 miles by 169 miles above the surface.

3:02 p.m.—Scheduled 15-minute color television show from moon orbit.

4:42 p.m.—Second shorter firing of main engine places craft in orbit 62 by 76-miles which by rendezvous day will have decayed to a 69-mile circular orbit because of the moon gravity effect.

6:22 p.m.—Aldrin enters lunar lander to clean house and prepare the craft for its big day, then returns to command ship.

9:32 p.m.—Crew begins nine-hour sleep period.

Twin Cities television coverage today:

WCCO (Ch. 4)—Progress reports at noon and 5:30, 6 and 10 p.m.

KSTP (Ch. 5)—noon to 1 p.m., entry of lunar orbit; 3 to 3:30 p.m., live transmission from Apollo 11; tentatively scheduled report following baseball game.

KMSP (Ch. 9)—noon to 1:30, entry of lunar orbit; 3 to 3:30, live transmission.

Aldrin Sought Advice for Words on Moon

HOUSTON, Texas (A) -Several weeks ago Col. Edwin E. Aldrin Jr. sought out his minister. His problem: To find the right words for when he steps onto the moon and to come to grips with the meaning

"We just talked about it in general," the Rev. M. Dean Woodruff of the Webster, Texas, Presbyterian Church said Friday

about his meeting with the spaceman several weeks before Apollo 11 rocketed into space. RELIGION PLAYS a significant role in Aldrin's life. He is an elder of the

Webster church and taught

Sunday school with his

wife.

suggested verses from the Bible's Eighth Psalm.

The song of praise rejoices:

"When we behold the heavens, the work of Your fingers, the moon and the stars which You set in place; what is man that You should be mindful of him, or the son of man that You should care for

Aldrin and Armstrong carry a tiny time capsule that contains a microfilmed parchment on which Pope Paul, spiritual leader of the world's Roman Catholics, wrote a message.

The Pope also quoted from the Bible the same verses suggested by Al-

drin's father.

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send the module into a lunar orbit. IF THE ASTRONAUTS

start the firing sequence and nothing happens, what would they do? Buzz Aldrin treats the question lightly. "We're going to spend our time learning as much as we can about that ascent engine," he says. How much time would they have? "It would be a

matter of a couple of days," answers Armstrong. Then their oxygen would give out. During this period, astronauts and ground controllers would try to de-

termine the problem and correct it. Every alternate

means of starting the engine would be tried. Engineers on the ground would go over every valve, fitting and fuel line both on blueprints and on an actual engine. If, at the end of 48 hours or so, the engine cannot be started, Collins will have to return to Earth alone. OF THIS situation, Col-

lins remarks, "There's a

remote possibility that

they could get into a posi-

tion where I would have

to leave them on the moon. But that's the sort of thing ground control would decide, not me." Since it is only necessary for the propellants to come together in order for the engine to start, the possibility of complete failure is less than that of

improper or unstable burn-

ing in the combustion chamber. All of the usable load of

propellent, some 5,200 pounds, must be burned to produce the 3,500 pounds of thrust needed to get the astronauts into a 10-by-52-mile orbit. If they make it this far, they are safe. Even if something goes wrong, Collins can come down to get them. But if the ascent engine does not boost them into an orbit high enough for Collins to reach them, Armstrong and Aldrin will be unable to get back.

THE ENGINE has been test fired over 3,000 times. It was started successfully on one unmanned and two manned flights. The particular engine now on its way to a moon landing has been test-fired both at sea level and under vacuum conditions similar to those on the Engineers and astronauts are fully confident that it will do its job. But the engine has never been tested on the moon. It has never been subjected to the reduced gravity of the moon or to moon dust

been tested under the conditions in which it will be used, and there is always the possibility that it won't

blown around by the ex-

haust of the descent en-

gine. In short, it has never

work properly. If such a tragedy does occur, it would set the program back for a year or more, as did the launch pad fire that killed three astronauts in 1967. There would be great pressure brought on NASA to provide a rescue system before men venture to the moon again. As for the astronauts,

Frank Borman summed up their feelings on Apollo 8 when he, Jim Lovell and Bill Anders faced the possibility of being stranded in lunar orbit: "You don't lay a wake nights thinking about it not working," he said. "The engine has been well tested and we've engineered the possibility of failure to an acceptable level. I would compare the risks to those of a combat tour in Viet-

nam. If we really believe

what we're doing is worth-

while, we have to accept

the risks."